

Application No. 10/509,471

AMENDMENTS TO THE CLAIMS

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Please amend the claims as follows:

Claims 1-20 (canceled)

21. (currently amended) A method for recognition of biometric data, comprising:

illuminating an object using a light source;

simultaneously acquiring a plurality of images of the object from at least two different imaging directions using optical scanning at least one optical detector device;

acquiring numerical data for each of at least two of the plurality of images using digital image processing;

calculating a three-dimensional model of the object from the numerical data of each of the at least two images;

comparing the three-dimensional model to a reference model, wherein the reference model is acquired from a plurality of other images; and

recognizing the object as a correct object when the numerical data from the each of the at least two images simultaneously correspond with data from the reference model within a predetermined tolerance,

wherein the biometric data includes at least one characteristic of one of a finger or a face of a person, and

wherein the illuminating of the object includes directing an illumination path coming laterally from the light source onto the object and wherein the acquiring of

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numerical data includes analyzing both a reflected portion and a portion transmitted portion through the object using at least one of a spectroscopic analysis and a scattered-light-spectroscopic analysis.

22. (cancelled)

23. (previously presented) The method as recited in claim 21, wherein characteristic recognition attributes (mF) of dermal ridges of a reference object are acquired in a reference function  $R(z, y, mF)$  for acquiring the reference model, and wherein the comparing includes comparing a recognition function  $F(z, y, mF)$  describing characteristic recognition attributes (mF) of dermal ridges of the object with the reference model.

24. (previously presented) The method as recited in claim 21, wherein discrete geometric structure attributes are analyzed from at least one of the images.

25. (previously presented) The method as recited in claim 24, wherein the object is a finger and wherein the three-dimensional model describes a geometric shape of a front phalanx of the finger.

26. (previously presented) The method as recited in claim 25, wherein the numerical data includes at least one of a length of the phalanx LG, a width of the phalanx bG, a length of the nail IN, a width of the nail bN, a projected area of the phalanx FG, a

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projected area of the nailbed FN and a coefficient derived from at least one of 1G, bG, IN, bN, FG, and FN.

27. (previously presented) The method as recited in claim 24, wherein the object is a face, wherein the plurality of images includes a front image and a lateral image, and wherein an ear is at least partially visible in the lateral image.

28. (previously presented) The method as recited in claim 21, wherein the illuminating of the object includes projecting one of a light slit and a light raster onto the object so as to form a contour on a spatial surface of the object, wherein at least one of the plurality of images is acquired using light of a first wavelength and at least one other of the plurality of images is acquired using light of a second wavelength different from the first wavelength used, and wherein a characterizing of the contour of a partial area of the object is used as an additional parameter for recognizing a concordance of the object with the reference model.

29. (cancelled)

30. (previously presented) The method as recited in claim 21, wherein a first wavelength is 678 nm and a second wavelength ranges from 808 nm to 835 nm, the first wavelength representing light to acquire at least one of the plurality of images and the second wavelength representing light to acquire at least one other of the plurality of images.

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31. (previously presented) The method as recited in claim 21, wherein the illuminating is performed punctually using additional light sources in at least one of a visible and infrared spectral range two at least two points on the object and wherein an intensity of the light back diffused from the object is measured at the at least two points and compared to a reference value.

32. (previously presented) The method as recited in claim 31, wherein a place of maximal intensity is determined for the at least two points and a mean value is calculated from the value of at least two intensity centroids.

33. (previously presented) The method as recited in claim 21, wherein the plurality of other images are acquired by skewing the object stepwise around an axis running through the object and wherein at least two of the plurality of other images are saved in several discrete situations respectively and are joined together to at least one three-dimensional model reference model.

34. (previously presented) The method as recited in claim 21, wherein a plurality of light sources are switched in a pulse-coded manner and, synchronously, an analysis of the signals is performed using an image receiver array.

35. (previously presented) An apparatus for carrying out the method according to claims 21, the apparatus comprising:

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at least one illumination device configured to emit at least one of a visible and an infrared light; and

at least two light detectors configured to acquire independent images.

36. (previously presented) The apparatus as recited in claim 35, wherein the at least two light detectors are disposed in at least one image receiver array.

37. (previously presented) The apparatus as recited in claim 36, wherein the array includes a CMOS array having at least two areas are arranged for acquiring separated images and further comprising a device for optical merging of two images disposed in front of the array.

38. (previously presented) The apparatus as recited in claim 36, wherein the at least one illumination device includes at least two light sources disposed in one of a pairwise and a ring-shaped manner around at least one of the at least two light detectors so as to illuminate the object punctually and wherein the at least one of the at least two light detectors acquires a backscattered intensity distribution.

39. (previously presented) The apparatus as recited in claim 38, wherein a plurality of light detectors acquires the intensity distribution.

40. (previously presented) The apparatus as recited in claim 39, wherein the plurality of light detectors are part of an electronic camera and wherein several images are

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acquired by the camera from different directions and are merged using beam-combining optical elements.

41. (previously presented) The apparatus as recited in claim 38, wherein for punctual illumination, the at least two light sources are disposed as an independent module.

42. (previously presented) The method as recited in claim 21, wherein the plurality of images of the object from at least two different imaging directions is acquired within a period of time of 0.1 seconds or less.

43. (currently amended) A method for recognition of biometric data, comprising:

- illuminating an object using a light source;
- acquiring a plurality of images of the object from at least two different imaging directions using optical scanning at least one optical detector device;
- acquiring numerical data for each of at least two of the plurality of images using digital image processing;
- comparing the numerical data to a reference model, wherein the reference model is acquired from a plurality of other images; and
- recognizing the object as a correct object when the numerical data from the each of the at least two images correspond with data from the reference model within a predetermined tolerance,

wherein the illuminating of the object includes directing an illumination path coming laterally from the light source onto the object and wherein the acquiring of

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numerical data includes analyzing both a reflected portion and a portion transmitted ~~portion through the object~~ using at least one of a spectroscopic analysis and a scattered-light-spectroscopic analysis, and

wherein a first wavelength is 678 nm and a second wavelength ranges from 808 nm to 835 nm, the first wavelength representing light to acquire at least one of the plurality of images and the second wavelength representing light to acquire at least one other of the plurality of images.

44. (currently amended) A method for recognition of biometric data, the method comprising:

illuminating an object using a light source;

acquiring a first image via a first detector device based on a first wavelength, the first detector device receiving light reflected from the object;

analyzing the reflected light received by the first detector device using spectroscopic analysis;

acquiring a second image substantially ~~simultaneously~~ simultaneously with the first image, the second image being acquired via a second detector device based on a second wavelength that is different than the first length, the second detector device receiving a transmitted portion of light that is transmitted through the object, the second detector device being in a direct illumination path of the light source;

analyzing the transmitted portion received by the second detector device using scattered-light spectroscopic analysis;

providing numerical data based on each of the analysis of the spectroscopic

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analysis and the scattered-light spectroscopic analysis;

comparing the numerical data to a reference model; and

recognizing the object as a correct object when the numerical data from reference model corresponds, within a predetermined tolerance, to the numerical data based on each of the analysis of the spectroscopic analysis and the scattered-light spectroscopic analysis.